

Docket No.: 0365-0600PUS1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:
Risto TUOMINEN

Application No.: Not Yet Assigned

Confirmation No.: N/A

Filed: July 23, 2004

Art Unit: N/A

For: METHOD FOR EMBEDDING A
COMPONENT IN A BASE AND FORMING A
CONTACT

Examiner: Not Yet Assigned

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The PTO is requested to use the amended sheets/claims attached hereto (which correspond to Article 19 amendments or to claims attached to the International Preliminary Examination Report (Article 34)) during prosecution of the above-identified national phase PCT application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

Dated: July 23, 2004

MKM/clb

Attachment(s)

Respectfully submitted,

By

Michael K. Mutter

Registration No.: 29,680



(703) 205-8000

Attorneys for Applicant

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference ELC 2 PCT		FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA416)
International application No. PCT/FI 03/00064	International filing date (day/month/year) 28.01.2003	Priority date (day/month/year) 31.01.2002
International Patent Classification (IPC) or both national classification and IPC H05K1/18		
Applicant IMBERA ELECTRONICS OY et al.		
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 5 sheets.</p>		
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the opinion</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>		
Date of submission of the demand 20.05.2003		Date of completion of this report 17.05.2004
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer Batev, P Telephone No. +49 89 2399-7970 

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/FI 03/00064

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-15 as originally filed

Claims, Numbers

1-21 filed with telefax on 26.04.2004

Drawings, Sheets

1/11-11/11 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**

International application No. PCT/FI 03/00064

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-21
	No: Claims	none
Inventive step (IS)	Yes: Claims	1-21
	No: Claims	none
Industrial applicability (IA)	Yes: Claims	1-21
	No: Claims	none

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: US-A-5306670
D2: US-A-3192307
D3: WO-A1-0021344

1. The present invention relates to a method for embedding components in a base and forming contacts.
2. The object of the invention is to provide the embedded components with contacts having high reliability.
3. Document D1, which is considered to represent the most relevant state of the art, discloses (col. 7, l. 1 - col. 8, l. 2; Figs. 5a and 5b) a method for embedding a component 84 in a base 76 and forming electrical contacts with the component, the method comprising the steps of:
 - taking a baseboard 76 as the base,
 - making a hole 82 in the baseboard,
 - making conductive patterns 80 on the baseboard,
 - placing a component 84 in the hole 82, the component, the component having on its first surface contact areas for creating electrical contacts,
 - securing the component 84 in place in the hole 82,
 - making an insulating layer 90 on at least one surface of the base, the insulating layer 90 covering the component 84,
 - making contact openings 94, 96 for the component in the insulating layer, and
 - making conductors 104, 106 to the conducting openings 94, 96 and on top of the insulating layer, thereby forming electrical contacts with the component.

The method proposed in claim 1 is distinguished over this known method at least in that:

- the hole is made in the baseboard after making the conductive patterns, the position of the hole being selected in relation to the conductive patterns made on the baseboard,

- after making the hole a tape is laminated on the second surface of the baseboard,
- the component is placed in the hole against the tape,
- the component is secured by filling the hole with filler material, and
- after securing the component, the tape is removed.

The subject matter of claim 1 appears, therefore, novel (Article 33(2) PCT).

4. None of the other cited documents, which reflect the technological background, discloses or gives an incitement to the specific solution defined in claim 1.

Document D2 discloses a method wherein a component is placed within an opening made in a circuit board and then an upper and lower connector elements comprising each an insulating base and conductive areas are disposed over each surface of the board, thereby establishing electrical connection between the leads of the component and the conductor pattern on the circuit board.

Document D3 describes a method wherein components are secured in an opening in a baseboard by filling the hole with resin and then the assembly is sandwiched between two resin coated copper foils.

In view of the available prior art, the subject matter of claim 1 appears, therefore, to involve an inventive step (Article 33(3) PCT).

5. Claims 2 - 20 which define preferred embodiments of the invention are dependent on claim 1 and as such also meet the requirements of the PCT in respect of novelty and inventive step.

6. Product claim 21 is independent as it refers to claims of a different category. Such a claim should define clearly all essential features of the invention, i.e of the claimed product. However, no proper features of an electronic module are specified in said claim. This results in lack of clarity of the subject matter.

Insofar as the examiner can understand the subject matter of claim 21, the following is pointed out:

The module claimed in claim 21 appears to differ from the modules disclosed in D1 and D2 at least in that the component is secured in place by a filler material. It differs from the assembly known from D3 at least in that the contact areas of the embedded component are level with the surface of the baseboard. There are no indications to combine the teachings of the the cited documents.

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/FI03/00064

7. The term "tape-like" (claims 1 and 5 - 8) has no well-recognised meaning and renders the definition of the subject-matter unclear (Guidelines, Chapter III-4.5).
8. The first method step defined in each of dependent claims 5 - 8, i.e. "the tape ... is removed", repeats a step already defined in claim 1. This leads to lack of clarity of the claims.
9. The features of the claims are not provided with reference signs placed in parentheses in order to facilitate their understanding (Rule 6.2(b) PCT).
10. Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 and D2 is not mentioned in the description, nor are these documents identified therein.
11. The first paragraph on page 10 of the description (see, in particular, lines 9 - 11) implies that the subject-matter for which protection is sought may be different to that defined by the claims. This results in lack of clarity of the claims (Article 6 PCT) when the description is used to interpret them (see the Guidelines, C-III, 4.3a).
12. The unit of measurement "micron" used on page 11 of the description does not meet the requirements of Rule 10.1/(a)/and/(b) PCT and is not additionally expressed by the appropriate SI units (see the Guidelines, Chapter II-4.15).

JT12 Rec'd PCT/PTO 23 JUL 2004

16

Claims:

1. A method for embedding a component in a base and for forming electrical contacts with the component, the method comprising

- 5 - taking a baseboard as the base,
- making a hole in the baseboard,
- placing a component in the hole, the component having, on its first surface, contact areas or contact protrusions for creating electrical contacts,
- securing the component in place in the hole made in the baseboard,
- 10 - making an insulating layer on at least one surface of the base, in such a way that the insulating layer covers the component,
- making contact openings for the component in the insulating layer, and
- making conductors to the contact openings and on top of the insulating layer, in order to form electrical contacts with the component,

15 characterized by

- making conductive patterns on the baseboard,
- selecting the position of the hole and aligning the component in relation to the conductive patterns made on the baseboard,

and after making the hole

- 20 - laminating a tape or a tape-like film on the second surface of the baseboard,
- placing the component in the hole made in the baseboard from the first-surface side of the baseboard, so that the first surface of the component lies against the tape or tape-like film and is substantially on the same level as the second surface of the baseboard,
- 25 - securing the component in place in the hole made in the baseboard by filling the hole with a filler material, and
- after securing the component, removing the tape or tape-like film laminated on the second surface of the baseboard.

17

2. A method according to Claim 1, in which the hole, which is made in the baseboard of the circuit board for a component, is a through hole.

3. A method according to Claim 2, in which insulating material is grown on the side walls of the hole made for a component, in order to create interference protection around the component.

4. A method according to any of Claims 1 - 3, in which the component to be placed in the hole is a microcircuit.

5. A method according to Claim 4, in which, after the securing of the microcircuit

- the tape or tape-like film laminated on the second surface of the baseboard is removed,

- an RCC foil is laminated onto the second surface of the baseboard, and
- conductive patterns and contact openings for the components are made in the RCC foil.

6. A method according to Claim 4, in which holes are made for feed-throughs and, after the securing of the microcircuit

- the tape or tape-like film laminated on the second surface of the baseboard is removed,

- RCC foils are laminated onto the first and second surfaces of the baseboard,
- conductive patterns and contact openings for the components and feed-throughs are made in the RCC foil laminated onto the second surface of the baseboard, and

- conductive patterns and contact openings for the feed-throughs are made in the RCC foil laminated onto the second surface of the baseboard.

7. A method according to Claim 4, in which, after the securing of the microcircuit

- the tape or tape-like film laminated on the second surface of the baseboard is

18

removed,

- a pre-preg epoxy foil is made on the second surface of the baseboard,
- contact openings for the component are made in the epoxy foil, and
- conductive patterns are made on top of the epoxy foil.

5

8. A method according to Claim 4, in which holes for feed-throughs are made in the base, and, after the securing of the microcircuit

10

- the tape or tape-like film laminated on the second surface of the baseboard is removed,
- pre-preg epoxy foils are laminated onto the first and second sides of the baseboard,
- contact openings for the component and feed-throughs are made in the epoxy foil of the second surface of the baseboard, and
- contact openings for the feed-throughs are made in the epoxy foil of the first surface of the baseboard.

15

20

9. A method according to any of Claims 4 - 8, in which an electrical contact is formed with the microcircuit from the direction of the second surface of the baseboard, after the microcircuit has been placed in the hole made in the baseboard.

25

10. A method according to any of Claims 4 - 9, in which an electrical contact is formed with the microcircuit by growing conductive material in the contact areas of the microcircuit, or on top of its contact protrusions.

30

11. A method according to any of Claims 4 - 10, in which the electrical contact with the microcircuit is formed without solder using a circuit-board manufacturing technology.

12. A method according to any of Claims 1 - 11, in which more than one component is embedded in the base in a corresponding manner.

13. A method according to Claim 12, in which a separate hole is made in the baseboard for each component to be embedded in the base and each component to be embedded in

19

the base is located in its own hole.

14. A method according to any of Claims 1 - 13, in which at least two microcircuits are embedded in the base, and in which a conductive layer is grown, which is connected directly to the contact areas or contact protrusions of at least two microcircuits, in order to connect the microcircuits electrically to each other to form an operational totality.

15. A method according to any of Claims 1 - 14, in which a multi-layer structure is manufactured, in which there are at least four conductive layers on top of each other.

16. A method according to any of Claims 1 - 15, in which a first base and at least one second base are manufactured and the bases are assembled and secured on top of each other in such a way that the bases are aligned in relation to each other.

17. A method according to any of Claims 1 - 15, in which

- a first and a second base and an intermediate layer are manufactured,
- the second base is placed above the first base and the second base is aligned in relation to the first base,
- the intermediate layer is placed between the first and the second bases, and
- the first and second bases are laminated to each other with the aid of the intermediate layer.

18. A method according to Claim 17, in which

- at least one third base and an intermediate layer for each third base are manufactured,
- each third base is placed in turn above the first and second bases and each third base is aligned in relation to one of the lower bases,
- an intermediate layer is placed beneath each third base, and
- the first, second, and each third base are laminated to each other with the aid of the intermediate layers.